EFFECTS OF IRRIGATION REGIMES AND CROP ROTATION ON BULK SOIL MASS

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Abstract. *This article presents the results of studies on the effects of short-row and crop rotation, deep tillage on soil bulk density between the rows of cotton.*
Keywords: *cotton, experiment, cropping systems, irrigation, short-row.*

Before studying the effects of short rotation cropping systems, irrigation regimes and different rates of mineral fertilizers on soil bulk density in field experiment 3, it was found to be 1.274 h/cm^3 in the 0-30 cm layer and 1.418 h/cm^3 in the 30-50 cm layer. (Table 1). This is considered optimal for the growth and development of any plant.

Table 1

Experiment 3 Volumetric mass and porosity of the soil at the beginning of the period of operation

Soil layer, cm	Density, g/cm^3
0-10	1,242
10-20	1,265
20-30	1,315
0-30	1,274
30-40	1,361
40-50	1,476
30-50	1,418
50-60	1,472
60-70	1,463
70-80	1,419
80-90	1,415
90-100	1,362
40-100	1,435
0-100	1,379

It was observed that the volume mass of the soil was different according to the options under the influence of the applied factors towards the end of the cotton period. In the 70-70-60% irrigation regime of the short-row rotation 1:1, winter wheat: cotton system, when mineral fertilizers were applied at the rate of $N_{160}P_{112}K_{80}$ kg/ha, the volume mass of the soil in the 0-30 cm layer was 1,328 g/cm^3, 30-50 cm layer was found to be 1.452 g/cm^3. In this crop rotation system, when mineral fertilizers $N_{200}P_{140}K_{100}$ and $N_{240}P_{168}K_{120}$ kg/ha were applied, the volume mass of the soil in the 0-30 cm layer decreased by 0.003-0.007 h/cm^3 compared to option 1. was noted that the volume mass of the soil was 0.006-0.013 h/cm^3 in the 30-50 cm layer (Table 2).

In the 1:1 winter wheat: cotton system of short rotation, it was observed that the volume mass of the soil increased due to the increase of the irrigation regime when the irrigation regime was 70-75-65% compared to the irrigation regime of 70-70-60%. The volume mass of the soil in

the 0-30 cm layer in the 4-5-6 options with the irrigation mode of 70-75-65% compared to the 1-2-3 options with the irrigation mode of 70-70-60% is 0.021-0.022-0.024 g/ It was found that it increased compared to cm^3. In the 1:1 winter wheat: cotton system of short-row rotation, the most positive volume mass of the soil was recorded in option 3 (1,321-1,439 g/cm^3) where mineral fertilizers were applied at the rate of $N_{240}P_{168}K_{120}$ kg/ha in the regime of 70-70-60% irrigation.

Table 2

Experiment 3 soil bulk density and porosity

Var no	Short rotation cropping systems	Irrigation pattern of cotton in relation to BdFMC, %	Standards of mineral fertilizers used in cotton, kg/ha	Soil layer, cm	Volumetric mass of soil, g/cm3
1	1:1, winter wheat: cotton	70-70-60 %	N_{160} P_{112} K_{80}	0-30	1,328
				30-50	1,452
2			N_{200} P_{140} K_{100}	0-30	1,325
				30-50	1,446
3			N_{240} P_{168} K_{120}	0-30	1,321
				30-50	1,439
4		70-75-65 %	N_{160} P_{112} K_{80}	0-30	1,349
				30-50	1,457
5			N_{200} P_{140} K_{100}	0-30	1,347
				30-50	1,452
6			N_{240} P_{168} K_{120}	0-30	1,345
				30-50	1,449
7	1:1, winter wheat+repeated crop soybean: cotton	70-70-60 %	N_{160} P_{112} K_{80}	0-30	1,326
				30-50	1,445
8			N_{200} P_{140} K_{100}	0-30	1,323
				30-50	1,443
9			N_{240} P_{168} K_{120}	0-30	1,320
				30-50	1,443
10		70-75-65 %	N_{160} P_{112} K_{80}	0-30	1,347
				30-50	1,456
11			N_{200} P_{140} K_{100}	0-30	1,344
				30-50	1,450
12			N_{240} P_{168} K_{120}	0-30	1,339
				30-50	1,448
13	1:1, winter wheat+repeated crop soybean+mixed siderate crops (oats, blue peas, rapeseed):cotton	70-70-60 %	N_{160} P_{112} K_{80}	0-30	1,319
				30-50	1,436
14			N_{200} P_{140} K_{100}	0-30	1,317
				30-50	1,434
15			N_{240} P_{168} K_{120}	0-30	1,314
				30-50	1,431
16		70-75-65 %	N_{160} P_{112} K_{80}	0-30	1,325
				30-50	1,445

17			N_{200} P_{140} K_{100}	0-30	1,322
				30-50	1,442
18			N_{240} P_{168} K_{120}	0-30	1,320
				30-50	1,435

When analyzing the data obtained from the field experiments, the volume mass of the soil in the options planted in the 1:1 short-row rotation, winter wheat-repeated crop soybean:cotton system compared to the options planted in the short-row rotation 1:1, winter wheat:cotton, the leguminous crop soybean and from it was found that it was better due to the amount of remaining root residues. 7-8 of the short repeated crop 1:1, winter wheat+repeated crop soybean: cotton, the irrigation regime was 70-70-60%, mineral fertilizers were applied at the rates of $N_{160}P_{112}K_{80}$ kg/ha, $N_{200}P_{140}K_{100}$ kg/ha and $N_{240}P_{168}K_{120}$ kg/ha. In options 9, 1:1 short-rotation, winter wheat:cotton system, mineral fertilizers $N_{160}P_{112}K_{80}$ kg/ha,

According to the results of field experiments, short-row rotation 1:1, winter wheat + repeated crop soybean: cotton system was used, 70-75-65% irrigation regime in 10-11-12 variants 0-30 according to the increase of mineral fertilizers. In the cm layer, the volume mass of the soil was 1,347-1,344-1,339 g/cm^3, and in the 30-50 cm layer, the volume mass of the soil was 1,456-1,450-1,448 g/cm3, respectively. It was found that the best volume mass of soil in the agro background where this crop rotation system was used was option 12, and its volume mass was 1.339 g/cm3 in the 0-30 cm soil layer, and 1.448 g/cm^3 in the 30-50 cm layer.

Analyzing the results obtained from the field experiments, 1:1 short rotation, winter wheat+repeated soybean+mixed intercrops (oats, green peas, rapeseed):cotton planted with 70-70-65% irrigation regime was used 13-14-15- it was noted that the volume mass of the soil was 0.009-0.008-0.007 g/cm^3 less than the control options planted in the 1:1 winter wheat: cotton system, and 0.016-0.012-0.008 g/cm^3 in the 30-50 cm layer. In this crop rotation system, in options 16-17-18, where the irrigation regime is increased to 70-75-65%, the 1:1 short-row rotation, winter wheat: cotton system is 0.003-0.003-0.003-0.003- 0.001 g/cm^3 and 0.024-0.025-0.025 g/cm^3 were positive compared to 70-75-65% irrigation regime.

The results of the analysis carried out in the experiment showed that the volume mass of the soil by the end of the operation period achieved the best results in the short-row rotation 1:1, winter wheat + repeated crop soybean + mixed intermediate crops (oats, blue peas, rapeseed): cotton planted, 70- It was observed in option 15, which was irrigated in 70-65% irrigation mode, mineral fertilizers were applied at the rate of $N_{240}P_{168}K_{120}$ kg/ha. In this option, the volume mass of the soil was 1.314 g/cm^3 in the 0-30 cm layer, and 1.431 g/cm^3 in the 30-50 cm soil layer, and this indicator was at the beginning of the application period.1.274-1.418 g/cm^3, and in the 1st option, which was calculated as control, it was 1.328-1.452 g/cm^3.

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